

Application Serial No. 10/069,852

What is claimed is:

1. (Currently Amended) A device for applying a plurality of microdroplets onto a substrate, comprising:

a plurality of nozzle orifices in a first surface of a dosing head;

walls for defining a liquid column of a medium to be dosed on each nozzle orifice;

a pressure chamber which is adapted to be filled with a buffer medium and which is arranged in such a way that said buffer medium can simultaneously be used for applying a pressure to ends of the liquid-columns, ~~ends~~ which are spaced apart from the nozzle orifices;

a pressure generator for applying a pressure to said buffer medium in such a way that a plurality of microdroplets ~~will~~ are simultaneously ~~be~~ applied onto the substrate through said plurality of nozzle orifices; and

liquid reservoirs for the media to be dosed, which are in fluid communication with the liquid columns on the nozzle orifices and comprise reservoir openings in a second surface of said dosing head opposite to said first surface.

wherein said pressure chamber is arranged such that said buffer medium does not apply a pressure to liquids in said liquid reservoirs via said reservoir openings.

2. (Original) A device according to claim 1, wherein the pressure generator is defined by a displacement diaphragm and an associated actor.

3. (Original) A device according to claim 1, wherein the buffer medium is air and wherein the pressure generator includes a compressed-air supply device which is provided with a valve and which is in fluid communication with the pressure chamber.

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4. (Currently Amended) A device according to claim 1, wherein the pressure generator comprises a tappet and an actor, wherein the actor is configured to actuate the tappet to apply a pressure to the buffer medium-being-adapted-to have a pressure applied thereto by actuating the tappet by means of the actor.
5. (Original) A device according to claim 1, wherein the walls for defining a liquid column on each nozzle orifice include a channel which leads to a respective nozzle orifice and which is adapted to be filled by a capillary effect.
6. (Currently Amended) A device according to claim 1, wherein the liquid reservoirs are connected via fluid lines to the walls means-for defining a liquid column, said fluid lines being implemented such that they permit capillary filling of the means for defining a liquid column.
7. (Currently Amended) A device for applying a plurality of microdroplets onto a substrate, comprising:
- a plurality of nozzle orifices in a dosing head;
- walls for defining a liquid column of a medium to be dosed on each nozzle orifice;
- a pressure chamber which is adapted to be filled with a buffer medium and which is arranged in such a way that said buffer medium can simultaneously be used for applying a pressure to ends of the liquid-columns, which are spaced apart from the nozzle orifices;
- a pressure generator for applying a pressure to said buffer medium in such a way that a plurality of microdroplets are simultaneously applied onto the substrate through said plurality of nozzle orifices; and
- liquid reservoirs for the media to be dosed, which are in fluid communication with the liquid columns on the nozzle orifices.

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wherein the liquid reservoirs are connected via fluid lines to the walls for defining a liquid column, said fluid lines being implemented such that they permit capillary filling of the means for defining a liquid column, and

5 ~~A device according to claim 6, wherein the liquid reservoirs are arranged in a first pattern in a first surface of the dosing head and wherein the nozzle orifices are formed in a second pattern in a second surface of the dosing head located opposite said first surface, the first and second patterns differing from one another in such a way that a format conversion takes place between the liquid~~
10 ~~reservoirs and the nozzle orifices.~~

8. (Original) A device according to claim 1, comprising in addition a vent port for venting the pressure chamber.

15 9. (Original) A device according to claim 1, wherein the liquid reservoirs are formed in a first main surface of the dosing head, said first main surface having arranged thereon a cover plate provided with one or a plurality of vent holes for the liquid reservoirs whose cross-sectional area is smaller than that of the liquid reservoirs.

20 10. (Original) A device according to claim 1, comprising in addition a cooler for cooling the liquid in the liquid reservoirs.

11. (Original) A device according to claim 1, wherein the surface of the dosing head having the nozzle orifices formed therein is provided with a cover layer having an
25 opening in the area of the nozzle orifices.

12. (Original) A device according to claim 1, wherein the dosing head is provided with recessed portions on its lateral edges in the dosing-head surface having the nozzle orifices formed therein, said recessed portions being brought into
30 engagement with a holding device.

13. (Currently Amended) A device according to claim 12, wherein the holding device is additionally implemented as a device for applying a supply so as to fill the liquid reservoirs provided in the device.

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14. (Original) A device according to claim 1, additionally comprising trench structures which surround respective nozzle orifices, said trench structures being implemented for binding by means of capillary forces superfluous liquid on the surface having the nozzle orifices formed therein.
- 5 15. (Original) A device according to claim 1, wherein the plurality of nozzle orifices and the walls for defining a liquid column are micromechanically formed in a silicon substrate.
- 10 16. (Original) A device according to claim 15, wherein also the liquid reservoirs and the fluid lines are formed, at least partially, in the silicon substrate.
- 15 17. (Original) A device according to claim 15, wherein the pressure chamber is defined by a recess formed in an intermediate plate which is applied to the silicon substrate.
- 20 18. (Original) A device according to claim 17, wherein the intermediate plate is additionally patterned so as to increase the capacity of the liquid reservoirs.
- 25 19. (Currently Amended) A device according to claim 1, wherein the liquid reservoirs are formed in the a first surface of the dosing head, said liquid reservoirs having arranged therein capillary structures.
20. (Currently Amended) A dosing head for a device for applying a plurality of microdroplets onto a substrate, said dosing head device comprising:
- 30 ~~a plurality of nozzle orifices in a dosing head;~~
- ~~walls for defining a liquid column of a medium to be dosed on each nozzle orifice;~~
- 35 ~~a pressure chamber which is adapted to be filled with a buffer medium and which is arranged in such a way that said buffer medium can simultaneously be used for applying a pressure to the liquid column ends which are spaced apart from the nozzle orifices;~~

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~~a pressure generator for applying a pressure to said buffer medium in such a way that a plurality of microdroplets will simultaneously be applied onto the substrate through said plurality of nozzle orifices; and~~

5 ~~liquid reservoirs for the media to be dosed, which are in fluid communication with the liquid columns on the nozzle orifices;~~

10 ~~said dosing head comprising a substrate having a the plurality of nozzle orifices in a first surface thereof, having a plurality of liquid reservoirs in a surface thereof which is located opposite to said first surface, and having fluid lines which connect respective nozzle orifices to respective liquid reservoirs and at least part of which is defined by open trenches formed in said first or second surface, said trenches having depth and width dimensions of such a nature that a liquid will be~~
15 ~~is retained therein by a capillary effect alone.~~

21. (Original) A dosing head according to claim 20, wherein the fluid lines have substrate through-holes whose flow resistance is smaller than the flow resistance defined by a nozzle orifice.

20 22. (Withdrawn) A method of producing a through-hole having a defined cross-sectional area in the substrate of a dosing head, said method comprising the steps of:

25 producing a first elongate trench structure of defined width and depth in a first surface of the substrate;

30 producing a second elongate trench structure of defined width and depth in a second surface of the substrate which is located opposite to said first surface, in such a way that said first and second trench structures intersect so that an opening having a defined cross-sectional area is formed in the area of intersection.

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